

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Thermoplastics and a sulfide are included and it is the resin constituent for black marking in which black marking is possible by the exposure of a laser beam.

[Claim 2] The resin constituent for black marking according to claim 1 whose sulfide is metallic sulfide.

[Claim 3] The resin constituent for black marking according to claim 1 whose sulfide is a transition-metals sulfide.

[Claim 4] The resin constituent for black marking according to claim 1 which furthermore contains a black stain pigment.

[Claim 5] The resin constituent for black marking according to claim 4 whose black stain pigment is carbon black.

[Claim 6] The resin constituent for black marking according to claim 5 whose mean particle diameter of carbon black is 10-90nm.

[Claim 7] The resin constituent for black marking according to claim 1 which furthermore contains a titanium dioxide.

[Claim 8] The Plastic solid which consisted of resin constituents according to claim 1 and in which black laser marking is possible.

[Claim 9] How to irradiate laser and carry out marking to a Plastic solid according to claim 8 black.

[Translation done.]

BEST AVAILABLE COPY

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is recyclable, and it excels in fabrication nature and shock resistance, and it relates to the cheap resin constituent for black marking while it has the resin constituent for black marking which can form black marking by the exposure of a laser beam, and the especially excellent black marking nature. More, by irradiating the laser beam which has the wavelength of 1064nm in a detail, the black alphabetic character or black pattern which can be recognized on a front face is related with the useful resin constituent for black marking, when obtaining the mold goods (for example, the keycap of a keyboard, the carbon button components of an automobile, etc.) in which marking is possible.

[002]

[Description of the Prior Art] After carrying out fabrication of the resin, generally printing the pattern of an alphabetic character, a design, a graphic form, etc., etc. on the front face of the mold goods is performed widely, and various approaches are learned as the approach of said printing. For example, recently, there is various technique to printing (laser marking is called hereafter) by the exposure of a laser beam from some which use coatings, such as TAMPO printing and sinking-in printing. Although the approach of using the former coating is the most common, a conversion cost is high, we are anxious about the environmental pollution by the solvent, and recycle is also difficult. On the other hand, compared with the approach of using a coating, since the process is simple, laser marking is cheap, its effectiveness is good, and since it has an advantage, such as excelling in the endurance of the printing section, industrial value is very high [marking]. For this reason, various techniques are being proposed about laser marking in recent years. For example, the technique which carries out marking to the front face of the mold goods of the resin constituent which blended with JP,56-45926,A the bulking agent which can be discolored by laser radiation is indicated.

[0003] Keyboards, such as a personal computer, are mentioned as an example of the mold goods which print an alphabetic character and a pattern by laser marking. Conventionally, as print processes on the front face of a key of a keyboard, although TAMPO printing to acrylonitrile-butadiene-styrene copolymer (ABS plastics) and sinking-in printing to polybutylene terephthalate (PBT resin) were in use, in recent years, the approach of trying out marking is becoming in use by irradiating laser beams, such as Nd:YAG laser, at ABS plastics in consideration of environmental problems and costs, such as recycle.

[0004] In usually, the case of the light gray and the cream system of lightness with the high color of mold goods Black or dark-colored marking can be performed. As such a resin ingredient for black marking For example, the constituent which made thermoplastics contain copper hydroxide-phosphate, molybdenum oxide, or a titanium dioxide (JP,3-24161,A), The constituent which it is chosen [constituent] out of the group which becomes thermoplastics from phosphoric-acid copper, a copper sulfate, the second copper of a basic phosphoric acid, and thiocyanic acid copper, and made a kind of copper salt contain at least, The constituent (JP,9-20855,A) which made (JP,8-187951,A) and ABS plastics contain at least two sorts of metallic oxides is indicated.

[0005] However, even if it uses these resin constituents, whenever [black], or quality of the alphabetic character or pattern by which marking was carried out are not enough, and it is difficult to improve whenever [black] greatly. Moreover, in JP,8-187951,A, copper sulfide is indicated to be unsuitable for laser marking.

[0006]

[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to offer the Plastic solid which consisted of a resin constituent for black marking which can perform clear black marking by the exposure of a laser beam, and this resin constituent.

[0007] Other purposes of this invention are to offer the Plastic solid which consisted of a resin constituent for black marking which can improve whenever [of a mark / black] by the exposure of a laser beam, and this resin constituent.

[0008] By irradiating a laser beam, the purpose of further others of this invention is clear, and is to offer the

approach of performing black marking by which it has been improved whenever black.

[0009]

[Means for Solving the Problem] this invention persons completed a header and this invention for high black marking whenever black being possible very vividly, when the laser beam was irradiated at the mold goods obtained from the resin constituent containing a sulfide as a result of inquiring wholeheartedly, in order to attain said purpose.

[0010] Namely, black marking is possible for the resin constituent for black marking of this invention by the exposure of a laser beam including thermoplastics and a sulfide. As a sulfide, metallic sulfide etc. can be used, for example. Moreover, said resin constituent may contain a black stain pigment. As a black stain pigment, a mean diameter can use the carbon black which is about 10-90nm, for example. Furthermore, said resin constituent may contain a titanium dioxide.

[0011] Moreover, the approach of carrying out black marking to the Plastic solid which consisted of said resin constituents, and this Plastic solid is also included in this invention.

[0012]

[Embodiment of the Invention] Since the resin constituent of this invention contains a sulfide, it can obtain high marking whenever black vividly.

[0013] As [thermoplastics] thermoplastics, especially if black marking is possible, it is not restricted but various thermoplastics can be used. As thermoplastics, styrene resin, polyester system resin, polycarbonate system resin, olefin system resin, acrylic resin, polyamide system resin, polyphenylene oxide system resin, vinyl system resin, etc. can be illustrated, for example. These resin is independent, or it is of the same kind respectively, or is different species, and it can be used, combining it two or more sorts.

[0014] (Styrene resin) As styrene resin, you may be any of a homopolymer and a copolymer that what is necessary is just to include at least one sort of styrene system monomers as a configuration monomer.

[0015] Styrene, alkylation styrene, halogenation styrene, alpha-alkylation styrene that the alkyl group permuted by the alpha position are contained in a styrene system monomer. Styrene, vinyltoluene, alpha methyl styrene, etc. are usually used among these.

[0016] Styrene resin may contain monomers other than said styrene system monomer as a configuration monomer. As such a monomer, a styrene system monomer and the monomer (acrylonitrile, methacrylonitrile, etc.) which can be copolymerized, for example, vinylcyanide system monomers, a maleic anhydride, imide system monomers (maleimide, N-alkyl maleimide, N-phenyl maleimide, etc.), an acrylic monomer [(meta) acrylic ester (meta), such as an acrylic acid and a methyl acrylate (meta), etc.], etc. are mentioned. These monomers are independent, or they can be used, combining them two or more sorts. Acrylonitrile is usually used among these. The amount of the monomers (acrylonitrile etc.) used in which the copolymerization in [all] a monomer is possible can be preferably chosen from about 8 - 30% of the weight of the range still more preferably five to 40% of the weight one to 50% of the weight.

[0017] Moreover, styrene resin may contain the rubber component. A rubber component can be made to contain in styrene resin by the blending method, copolymerization (graft polymerization, block polymerization, etc.), etc. As a rubber component, diene system rubber components (polybutadiene, Butadiene Styrene, polyisoprene, Butadiene Acrylonitrile, isobutylene-isoprene copolymer, etc.), ethylene-propylene rubber, acrylic rubber, polyurethane rubber (poly butyl acrylate etc.), silicone rubber, isobutylene isoprene rubber, etc. can be used. the content of the rubber component in rubber strengthening styrene resin -- for example, it is about 10 - 40 % of the weight still more preferably five to 50% of the weight preferably one to 70% of the weight.

[0018] Rubber denaturation styrene resin; styrene maleic anhydride copolymers (SMA), such as a polystyrene (GPPS); Pori (alpha methyl styrene); styrene acrylonitrile copolymer (AS resin); high-impact-polystyrene (HIPS) and styrene-butadiene copolymer, a styrene-acrylonitrile-butadiene copolymer (ABS plastics), alpha-methyl-styrene denaturation ABS plastics, and imide denaturation ABS plastics, etc. are contained in desirable styrene resin. These styrene resin is independent, or it can be used, combining it two or more sorts. The rubber denaturation styrene resin (ABS plastics, denaturation ABS plastics, etc.) which contains a rubber component as a configuration monomer from the point of balance with whenever [black], and shock resistance of marking among these, including the polymer which contains styrene as a configuration monomer, especially styrene is desirable.

[0019] the number average molecular weight of these styrene resin -- 20,000-200,000 -- it can choose from about 25,000 to 150,000 range preferably. especially -- the number average molecular weight of ABS plastics and an AS resin -- 20,000-100,000 -- desirable -- from about 25,000 to 80,000 range -- it can choose -- the number average molecular weight of GPPS and HIPS -- 30,000-200,000 -- it can choose from about 50,000 to 150,000 range preferably.

[0020] (Polyester system resin) The polymer obtained by dicarboxylic acid or the polycondensation of the

derivative and diol, the polycondensation of hydroxycarboxylic acid, or the ring opening polymerization of cyclic ester is mentioned that polyester system resin should just be a giant molecule which has an ester bond in a principal chain.

[0021] As polyester system resin, alkylene terephthalate for example, 1, 4-cyclohexane dimethylene terephthalate, and ethylene terephthalate -- Butylene terephthalate etc. and alkylene naphthalate Gay polyester or copoly ester (for example, makes ethylene naphthalate, butylene naphthalate, etc.) the main repeating units for example, C6-12 aliphatic-series dicarboxylic acid, such as isophthalic acid and an adipic acid, -- Two to C6 alkylene glycol, polyoxy alkylene glycol, Copoly ester, aromatic polyester (for example, with aromatic series diols, such as bisphenol A) which use bisphenol A, cyclohexane dimethanol, etc. as a copolymerization component the polyarylate generated according to esterification with aromatic series dicarboxylic acid, such as a terephthalic acid and isophthalic acid, etc. -- etc. -- it can illustrate. the copolymerization component in copoly ester -- usually -- 1-30-mol % -- it is about 3-20 mol % preferably. Moreover, liquid crystallinity polyester and an elastomer are also contained in polyester system resin.

[0022] The copoly ester which makes poly C 2-4 alkylene ant rates (polybutylene terephthalate etc.) or a C2-4 alkylene ant rate a main repeating unit is contained in desirable polyester system resin.

[0023] the number average molecular weight of polyester system resin -- 10,000-40,000 -- it can choose from about 15,000 to 30,000 range preferably.

[0024] (Polycarbonate system resin) A dihydroxy compound and the polymer obtained by the reaction with a phosgene or carbonic acid diester [diaryl carbonate (diphenyl carbonate etc.) or dialkyl carbonate (dimethyl carbonate, diethyl carbonate, etc.)] are contained in polycarbonate system resin. Although a dihydroxy compound may be an alicyclic compound etc., it is a bisphenol compound preferably.

[0025] As a bisphenol compound, screw (4-hydroxyphenyl) methane, 1 and 1-screw (4-hydroxyphenyl) propane, 2, and 2-screw (4-hydroxyphenyl) propane (bisphenol A), 2 and 2-screw (4-hydroxy-3-methylphenyl) propane, 2, and 2-screw (4-hydroxyphenyl) butane, 2 and 2-screw (4-hydroxyphenyl)-3-methyl butane, 2, and 2-screw (4-hydroxyphenyl) hexane, One to screw (hydroxy aryl) C6 alkanes, such as a 2 and 2-screw (4-hydroxyphenyl)-4-methyl pentane; 1 and 1-screw (4-hydroxyphenyl) cyclopentane, 1 and 1-screw Screws, such as a cyclohexane (4-hydroxyphenyl) Four to C10 cycloalkane; (Hydroxy aryl) 4, 4'-dihydroxy diphenyl ether; 4, 4'-dihydroxy diphenylsulfone; 4, 4'-dihydroxydiphenyl sulfide; 4, and 4'-dihydroxy diphenyl ketone etc. is mentioned.

[0026] A bisphenol mold, especially the bisphenol A mold polycarbonate are contained in desirable polycarbonate system resin.

[0027] the number average molecular weight of polycarbonate system resin -- 10,000-40,000 -- it can choose from about 12,000 to 30,000 range preferably.

[0028] (Olefin system resin) As olefin system resin, independent or the copolymer of alpha olefins (especially two to alpha-C 10 olefin), such as ethylene, a propylene, 1-butene, 3-methyl-1-pentene, a 4-methyl-1-butene, 1-hexene, and 1-octene, is mentioned, for example. As desirable olefin system resin, the ethylene system resin (for example, polyethylene, ethylene propylene rubber, an ethylene-(meta) acrylic-acid copolymer, etc.) which contains an ethylene unit as a principal component (for example, 75 - 100 % of the weight), the propylene stem resin (for example, a polypropylene and propylene-ethylene copolymer, a propylene-(meta) acrylic-acid copolymer, etc.) which contains a propylene unit as a principal component (for example, 75 - 100 % of the weight) are mentioned. Olefin system resin is independent, or it can be used, combining it two or more sorts.

[0029] the number average molecular weight of olefin system resin -- 15,000-200,000 -- it can choose from about 10,000 to 150,000 range preferably.

[0030] (Acrylic resin) The homopolymer or copolymer which contains at least one sort of monomers chosen from an acrylic monomer, for example, (meta), an acrylic acid, and (meta) acrylic ester as a configuration monomer is contained in acrylic resin.

[0031] (Meta) Acrylic-acid (meta) hydroxyalkyl, such as one to acrylic-acid (meta) C10 alkyls, such as a methyl acrylate, an ethyl acrylate, acrylic-acid propyl, butyl acrylate, acrylic-acid t-butyl, acrylic-acid hexyl, 2-ethylhexyl acrylate, and methacrylic ester corresponding to these, acrylic-acid (meta) 2-hydroxyethyl, and 2-hydroxypropyl acrylate (meta), metaglycidyl acrylate (meta), etc. are contained in acrylic ester. These (meta) acrylic ester is independent, or it can be used, combining it two or more sorts. One to acrylic-acid (meta) C6 alkyl (especially methyl methacrylate) etc. is contained in desirable (meta) acrylic ester.

[0032] Said copolymer may contain monomers other than an acrylic monomer as a configuration monomer. A vinyl ester monomer, a styrene system monomer, a vinylcyanide system monomer, a maleic anhydride, imide system monomers, etc., such as vinyl acetate, are mentioned that what is necessary is just an acrylic monomer and the monomer which can be copolymerized as such a monomer. Moreover, acrylic resin may contain the rubber component as a constituent.

[0033] the number average molecular weight of acrylic resin -- 20,000-200,000 -- it can choose from about

35,000 to 150,000 range preferably.

[0034] (Polyamide system resin) As polyamide system resin Nylon 46, nylon 6, Nylon 66, Nylon 610, Nylon 612, Nylon 11, Nylon 12, nylon 6 / 66, the aliphatic series polyamide of nylon 6 / 11 grades, Aromatic series dicarboxylic acid (for example, a terephthalic acid and/or isophthalic acid) and aliphatic series diamine (For example, hexamethylenediamine) from -- the polyamide obtained -- aliphatic series dicarboxylic acid The polyamide obtained from (for example, an adipic acid) and aromatic series diamine (for example, meta-xylylene diamine), The polyamide obtained from aromatic series and aliphatic series dicarboxylic acid (for example, a terephthalic acid and an adipic acid), and aliphatic series diamine (for example, hexamethylenediamine) is mentioned. These polyamides are independent, or can be mixed and used. Nylon 6, Nylon 66, Nylon 610, Nylon 612, Nylon 11, Nylon 12, nylon 6 / 66, and nylon 6 / 11 grades are contained in a desirable polyamide.

[0035] the number average molecular weight of polyamide system resin -- 10,000-40,000 -- it can choose from about 12,000 to 30,000 range preferably.

[0036] (Polyphenylene oxide system resin) A homopolymer and a copolymer are contained in polyphenylene oxide system resin. As a homopolymer, Pori (2, 6-dimethyl -1, 4-phenylene) oxide, Pori (2-methyl-6-ethyl -1, 4-phenylene) oxide, Pori (2, 6-G n-propyl -1, 4-phenylene) oxide, Pori (2-ethyl-6-isopropyl -1, 4-phenylene) oxide, Pori (2-methyl-6-hydroxyethyl -1, 4-phenylene) oxide, Pori (2-methyl-6-chloro ethyl -1, 4-phenylene) oxide, etc. are mentioned.

[0037] The denaturation graft copolymer the styrene system polymer is carrying out [the graft copolymer etc.] the graft to the denaturation polyphenylene oxide copolymer which consisted of an alkylphenol denaturation benzene formaldehyde-resins block which alkylphenols, such as cresol and p-tert-butylphenol, are made to react to benzene formaldehyde resins or alkylbenzene formaldehyde resins, and is acquired as a copolymer of polyphenylene oxide, and a polyphenylene oxide block as subject structure, polyphenylene oxide, or its copolymer is mentioned.

[0038] the number average molecular weight of polyphenylene oxide system resin -- 15,000-200,000 -- it can choose from about 10,000 to 150,000 range preferably.

[0039] (Vinyl system resin) as vinyl system resin -- vinyl system monomer [-- for example Vinyl ester, such as vinyl acetate, propionic-acid vinyl, crotonic-acid vinyl, and benzoic-acid vinyl; A chlorine content vinyl monomer (For example, vinyl chloride etc.); fluorine content vinyl monomer (for example, fluoro ethylene --) Chloroprene etc.; Vinyl ketones; vinyl methyl ether, such as a methyl vinyl ketone and a methyl isopropenyl ketone, Vinyl ether, such as the vinyl isobutyl ether; a copolymer with the monomer of], such as heterocycle type vinyl, such as N-vinylcarbazole and N-vinyl pyrrolidone, in which a copolymer or other copolymerization are independent or possible etc. is contained.

[0040] The derivatives (for example, polyvinyl acetals, such as polyvinyl alcohol, a polyvinyl formal, and a polyvinyl butyral, an ethylene-vinylacetate copolymer, an ethylene-vinylalcohol copolymer, etc.) of said vinyl system resin can also be used.

[0041] the number average molecular weight of vinyl system resin -- 15,000-200,000 -- it can choose from about 10,000 to 150,000 range preferably.

[0042] As other resin, polyacetal system resin; polyphenylene sulfide system resin (Other resin) for example, polyphenylene sulfide and a polyphenylene sulfide ketone -- A poly biphenylene sulfide, a polyphenylene sulfide sulfone, etc.; Polysulfone (For example, thermoplastic polysulfone, Pori (ether sulfone), Pori (4 and 4'-bisphenol ether sulfone etc.); thermoplastic polyurethane system resin (for example, with diisocyanate compounds, such as tolylene diisocyanate)) ; thermoplastic polyimide [, such as a polyurethane elastomer which may have segments obtained by the reaction with said glycol and/or said diamine, such as a polymer and a polytetramethylene glycol,]; polyoxy BENJIREN; thermoplastic elastomer etc. can be illustrated.

[0043] the number average molecular weight of other resin -- 15,000-200,000 -- it can choose from about 10,000 to 150,000 range preferably.

[0044] Although especially a [sulfide] sulfide is not restricted but sulfides, such as a metal, and B, C, As, P, N, H, Te, Se, are contained, metallic sulfide is usually used.

[0045] as metallic sulfide -- the [for example, / periodic-table] -- 1A group metallic sulfide [-- for example sulfuration lithium (Li_2S) and sodium-sulfide ($\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$, $\text{Na}_2\text{S} \cdot 5\text{H}_2\text{O}$, Na_2S)] and 2A group metallic sulfide [-- for example calcium sulfide (CaS) and barium sulfide (BaS)] and 3A group metallic sulfide [-- for example A sulfuration lanthanum (La_2S_3), a cerium sulfide (Ce_2S_3 , Ce_2S_4), sulfuration neodymium (Nd_2S_3), sulfuration plutonium (PuS , Pu_2S_3 , Pu_3S_4), a uranium sulfide (U_4S_3 , U_2S_3 , US_2 , US_3),], and 4A group metallic sulfide [-- for example titanium sulfide (Ti_2S , TiS , Ti_2S_3 , TiS_2 , TiS_3) and sulfuration zirconium (ZrS_2)] and 5A group metallic sulfide [-- for example sulfuration vanadium (V_3S , V_5S_4 , VS , V_3S_4 , V_5S_8 , VS_4), sulfuration niobium (NbS_3), and sulfuration tantalum (TaS_2)] and 6A group metallic sulfide [-- for example sulfuration chromium (CrS , Cr_3S_4 , Cr_2S_3) and molybdenum sulfide (Mo_2S_3 , MoS_2 , MoS_3)] and 7A

group metallic sulfide [-- for example Manganese sulphide (MnS , MnS_2)] and 8 group metallic sulfide [(it FeS (s)). for example, an iron sulfide Fe_3S_4 , Fe_2S_3 , FeS_2 , cobalt sulfide (Co_9S_8 , CoS , Co_3S_4 , CoS_2), and nickel sulfide ($\text{nickel}_3\text{S}_2$, $\text{nickel}_7\text{S}_6$, NiS)] and 1B group metallic sulfide [-- for example copper sulfide (Cu_2S , CuS , CuS_2), silver sulfide (Ag_2S), and gold sulfide (Au_2S , Au_2S_3 , AuS)] and 2B group metallic sulfide [-- for example zinc sulfide (ZnS , ZnS_2), cadmium-sulfide (CdS), and mercury sulfide (Hg_2S , HgS)] and 3B group metallic sulfide [-- for example sulfuration gallium (Ga_2S , GaS , Ga_2S_3)] and 4B group metallic sulfide [-- for example Silicon sulfide (SiS , SiS_2), germanium sulfide (GeS , GeS_2), tin sulfide (SnS , SnS_2), and plumbous sulfide (PbS)], 5B group metallic sulfide [for example, an antimony sulfide (Sb_2S_3 , Sb_2S_5)], etc. can be illustrated. among these -- usually -- periodic-table the 3A- the sulfide of 7A, 8 and 1B group transition metals, and 2B group metal (Zn , Cd , Hg), for example, zinc sulfide, copper sulfide, an iron sulfide, a cobalt sulfide, a nickel sulfide, etc. are used.

[0046] the amount of the sulfide used -- the thermoplastics 100 weight section -- receiving -- 0.01 - 10 weight section -- desirable -- 0.05 - 5 weight section -- it can choose from the range of 0.1 - 1.5 weight section extent still more preferably.

[0047] As a [black stain pigment] black stain pigment, organic or inorganic the color or pigment of a black system can be used. A black stain pigment absorbs a laser beam (for example, wavelength of 354nm - 1064nm), changes it into heat energy, and carries out the operation which promotes black marking.

[0048] As a black stain pigment, carbon black (acetylene black, lamp black, thermal black, furnace black, channel black, KETCHIEN black, etc.), graphite, black titanium oxide, black iron oxide, etc. can be illustrated. The field of cost to dispersibility, color enhancement, and especially carbon black are [among these] desirable. A black stain pigment is independent, or it can be used, combining it two or more sorts. In addition, although carbon black is classified into acetylene black, oil black, gas black, etc. according to a difference of a raw material, any carbon black can be used.

[0049] The mean particle diameter of a black stain pigment can be chosen from the range where for example, 10nm - 3 micrometer (preferably 10nm - 1 micrometer) extent is large. the case where a black stain pigment is carbon black -- mean particle diameter -- regardless of a process -- for example, 14-90nm (for example, 16-80nm) 10-90nm is 17-50nm (especially 17-40nm) extent still more preferably preferably. Many energy which marking will take if the particle size of a black stain pigment is too small is needed, and if too conversely large, it will be easy to cause the physical-properties fall of a mechanical strength etc. If carbon black of 10-30nm of mean diameters (for example, 15-20nm) is used especially, it is sharp and high marking whenever black is possible.

[0050] the amount of the black stain pigment used -- the thermoplastics 100 weight section -- receiving -- for example, 0.001 - 2 weight section -- desirable -- 0.001 - 1 weight section (for example, 0.001 - 0.5 weight section) -- it is 0.0025 - 0.5 weight section extent still more preferably.

[0051] Especially as long as [un-black stain pigment] un-black stain pigments are un-black stain pigments other than said black stain pigment, they may not be limited, but they may be organic or inorganic any. As an un-black stain pigment, an inorganic pigment is usually used.

[0052] as an inorganic pigment -- for example, a white stain pigment (for example, a calcium carbonate --) yellow pigments, such as titanium oxide (titanium white), a zinc oxide, zinc sulfide, and a lithopone for example, cadmium yellow (cadmium yellow), the chrome yellow (chrome yellow), and titan yellow -- Zinc chromate, ocher (ochre), Synthetic Ochre (MARUSU yellow), etc., Red pigments (for example, a shakkou pigment, umber, a red iron oxide (rouge, ****), cadmium red (fire red), a minium (a tri-iron tetraoxide, red lead), etc.), blue pigments (for example, Berlin blue, ultramarine blue, cobalt blue (TENARU blue), etc.), green pigments (for example, chrome green etc.), etc. are mentioned. These pigments are independent, or they can be used, combining them two or more sorts.

[0053] The white pigments (especially titanium dioxide) which are excellent in hiding power and dispersibility and make very clear black marking possible also in these while it is cheap are desirable. If it is used combining a black stain pigment and a white stain pigment probably because a white stain pigment scatters a laser beam (for example, wavelength of 1064nm) and raises remarkably the absorption efficiency of the laser beam by said black stain pigment, and the conversion efficiency to heat, very high black marking whenever black will be obtained. Moreover, the exposure energy intensity of a laser beam can be reduced.

[0054] 0.01-3 micrometers of mean particle diameter of an un-black stain pigment are about 0.01-1 micrometer preferably, for example. the loadings of an un-black stain pigment -- the thermoplastics 100 weight section -- receiving -- below 5 weight sections (for example, 0.01 - 5 weight section) -- it is extent still more preferably preferably below 2 weight sections (for example, 0.1 - 2 weight section) below 3 weight sections (for example, 0.05 - 3 weight section).

[0055] The resin constituent of this invention may contain a compatibilizer, other stain pigments, a flame retarder, bulking agents (a glass fiber, a carbon fiber, inorganic filler. etc.), a stabilizer, lubricant (an

antioxidant, ultraviolet ray absorbent, etc.), the dispersant, the foaming agent, the antimicrobial agent, etc. if needed. For example, advanced features (flameproofing, glass strengthening, etc.) can be attained by adding other stain pigments to a resin constituent, and being able to tone in desired color, and adding a flame retarder and a bulking agent.

[0056] Said resin constituent can be prepared by what (for example, melting kneading is carried out) said each component is mixed for by the mixed approach of the common use which used the extruder, the kneader, the mixer, the roll, etc.

[0057] Various mold goods can be manufactured by presenting the method of fabricating common use, such as extrusion molding, injection molding, and compression molding, with the resin constituent of this invention. And black marking can be performed to a front face by irradiating a laser beam at these mold goods. As equipment which irradiates a laser beam, although laser of common use, such as an YAG laser (for example, the wavelength of 354nm, 532nm, 1064nm), a CO2 laser, Ar laser, and an excimer laser, can be used, an YAG laser is used in many cases, for example.

[0058] Since the resin constituent of this invention contains a sulfide, it can improve black marking nature greatly. Since an alphabetic character etc. can be easily formed with a laser beam, without using a coating and ink, it can recycle and, moreover, is cheap. Therefore, it is useful when obtaining wide range mold goods used for a front face for an alphabetic character or a pattern, printing on it, such as OA equipment, such as a computer and a keyboard of a word processor, autoparts, household articles (carbon button components etc.), and a building material.

[0059] [Effect of the Invention] According to the resin constituent for black marking of this invention, by the exposure of a laser beam, clear black marking is possible and whenever [black] can be improved greatly. Moreover, in the resin constituent containing a black stain pigment, even if the exposure energy intensity of a laser beam is low, high marking whenever [very clear] black is obtained.

[0060] [Example] An example is given to below and this invention is explained to it still more concretely. However, this invention is not limited at all by these examples.
[0061] After the publication to Table 1 of each component of a publication having blended comparatively (weight section) to the conditions of laser marking, and the [evaluation approach] table 1 and producing a pellet by extrusion molding, the plate with a thickness of 3mm was produced with injection molding from this pellet, the laser beam was irradiated on this front face, and black marking nature was investigated. Nd which emits a laser beam with a wavelength of 1064nm as laser: The YAG laser was used. As exposure conditions, aperture was fixed to 2mm, a light source current value (LC), QS vibration frequency (QS), and speed (SP) were changed in the following range, the pattern was drawn, and the conditions by which marking is carried out the blackest estimated. A result is shown in Table 1.

[0062] Light-source (Current-value LC): 8-20AQS vibration frequency (QS):1 - 10kHz speed (SP):100-1500mm/second [0063] Black marking nature was judged on the following criteria by the following viewing.
O : -- whenever [of an alphabetic character / black] -- Sharp -- ** -- very much -- whenever [of a fitness O:alphabetic character / black] -- Sharp -- ** -- whenever [of a fitness **:alphabetic character / black] -- whenever [of x:alphabetic character whose alphabetic character is not / rough deposit sharpness / enough sufficiently but / black] -- Sharp -- ** -- it is not enough.

[0064] [The component used in the example and the example of a comparison (the contents of the abridged notation in Table 1)]

(Thermoplastics)

- Resin A : ABS plastics (the product made from Die Cel Chemistry, cevian V510)
- Resin B:HIPS (the product made from Oriental Styrene, Oriental styrol R65)
- Resin C:PBT (the Polyplastics make, Jura NEKKUSU)
- Resin D : polycarbonate (the product made from Idemitsu Petroleum, TAFURON A2200)
- Resin E : the polymer alloy of a polycarbonate and ABS plastics (the product made from Die Cel Chemistry, NOBAROI S1100)
- The polymer alloy of resin F:PBT and ABS plastics (the product made from Die Cel Chemistry, NOBAROI B1500)

(Stain pigment)

- CB-1 : carbon black (mean particle diameter of 17nm)
- CB-2 : carbon black (mean particle diameter of 83nm)
- Titanium oxide : titanium dioxide (mean particle diameter of 0.18 micrometers)

[0065]

[Table 1]

表 1

	実施例																	比較例	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2
樹脂A	100	100	100	100						100	100	100	100	100	100	100	100	100	100
樹脂B					100														
樹脂C						100													
樹脂D							100												
樹脂E								100											
樹脂F									100										
CuS	0.2	0.2	0.05	1	0.2	0.2	0.2	0.2	0.2					0.2	0.2	0.2	0.2		
FeS										0.2									
CoS											0.2								
NiS												0.2							
ZnS													0.2						
CB-1														0.01		0.005	0.05		0.01
CB-2															0.01				
酸化砂		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
目視観察	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×	×

[0066] Examples 1-17 realized very good black marking so that clearly from Table 1.

[translation done.]

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ ~~SKewed/SLANTED IMAGES~~
- ☒ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.